



The regulation of certain aspects of autonomous driving in the Italian legal system.

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Abstract

The paper focuses on several regulatory issues related to road safety and data protection. Among other things, it discusses the requirements and the role of the driver, the homologation of self-driving cars and the regulation of the different types of data used and produced by autonomous driving systems, considering the different levels of automation identified in the SAE standard J3016.

The recent development of autonomous vehicles asks for regulatory intervention, in relation to road safety and privacy. Therefore, after analyzing the state of the art on road traffic regulation, the contribution proposes the analogical application of some rules relating as well as the introduction of ad hoc legislation for autonomous driving.



Keywords: autonomous vehicles; regulation on autonomous driving; data protection.

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1. Regulation on autonomous driving and the homologation of self-driving cars in Italy.¹

1.1 An overview on the regulation on autonomous driving.

In Italy there is not a regulation on autonomous driving. However, a legislative intervention in this direction is foreseen and it would follow the legislation on the experimentation of autonomous vehicles, which is already in force in Italy since 2018².

Therefore, until the possible introduction of specific legislation for the regulation of autonomous vehicles, the legislation currently applicable to autonomous driving is the following: Civil Code,³ Road Traffic Code,⁴ Consumer Code,⁵ Private Insurance Code,⁶ and Privacy Code,⁷ applied directly or by analogy.

One of the main issues relating to driving, including the case of autonomous driving, is the civil liability for car accident. In this context the main rule on road traffic liability is Art. 2054 of Italian Civil Code. It is the basic provision for civil liability for damages resulting from road traffic. However, this disposition is not sufficient to regulate all the new cases of civil liability in light of the rapid development of onboard vehicle technology.

Article 2054, para 1, of the Italian Civil Code establishes that the driver is responsible for the damage caused by the movement of the vehicle without a

¹ This work is the result of the study carried out for the Swiss Institute of Comparative Law (ISDC) as part of the Legal opinion on the regulation of certain aspects of automated driving (Italy, Spain, Sweden, United Kingdom) of March 2022.

² Smart Road Ministerial Decree 28.02.2018, Smart Road Decree, available at www.normattiva.it.

³ Royal Decree 16.03.1942, n. 262, Italian Civil Code, available at www.normattiva.it.

⁴ Italian Legislative Decree 30.04.1992, n. 285, New Road Traffic Code, available at www.normattiva.it.

⁵ Italian Legislative Decree 6.09.2005, n. 206, Consumer Code, available at www.normattiva.it.

⁶ Italian Legislative Decree 7.09.2005, n. 209, Private Insurance Code, available at www.normattiva.it.

⁷ Italian legislative decree 30.06.2003, n. 196, Code regarding the protection of personal data, containing provisions for the adaptation of national law to regulation (EU) no. 2016/679 of the European Parliament and of the Council, of 27 April 2016, concerning the protection of individuals with regard to the processing of personal data, as well as the free circulation of such data and which repeals Directive 95/46/EC, available at www.normattiva.it.

rail guide, unless he/she proves to have done everything in his/her power to prevent the occurrence of the damage. This is a particular type of civil liability, so-called semi-objective liability, which provides for an inversion of the burden of proof with respect to the ordinary regime of non-contractual civil liability established by Article 2697 of the Italian Civil Code. In fact, pursuant to article 2054, paragraph 1, it is a task of the damaging party proving that he has done everything possible to avoid the damage.⁸

Regarding the special responsibility of the driver, it is first necessary to define his/her role. The driver is who physically controls the vehicle at the time of the occurrence of the damage. To have control means to have the controls of the vehicle, even if at the moment when the damage occurred, they were not used; therefore the driver will answer for damages caused by the vehicle even if this has been, for example, parked without handbrake on a sloping road or has been parked in the middle of a roadway. On the contrary, it is no longer considered as a driver who has given the commands to others, even if temporarily and under his/her control. Between the case in which the vehicle is considered under the control of the driver (traditional vehicles) and the one in which it is not under driver control (autonomous vehicle), there is the case of semi-autonomous vehicles where there is a driver driving the vehicle, but the driving control can be exercised by an ADAS that replaces in whole or in part to the driver in some specific driving activities, carrying out more or less important tasks depending on which it can also be limited or excluded the liability of the driver.⁹ In the case of completely autonomous vehicles,¹⁰ however, it seems logical to compare the person onboard the vehicle to passengers of a train or an airplane: as for the passenger of the train/plane there is no liability in case of an accident, so for the passenger of the driverless car will not be applicable the driver liability in the event of an accident.¹¹

In addition to the liability of the driver, it is necessary to consider that article 2054, para. 3, also provides for the liability of the owner of the vehicle or of persons equivalent to him/her. With a view to progressive automation of vehicles, we are moving further and further away from the figure of the driver while that of the owner is always central. It is a case of joint and several liability with the driver of the owner of the vehicle. The '*ratio*' of this kind of liability of

⁸ It should be noted that the burden of proof of the driver having acted diligently is valid only for damages caused to things or third parties unrelated to road traffic, instead, in the case of collision between two or more vehicles, the driver must also prove the fault of the other driver(s) (so-called presumption of equal co-responsibility, art. 2054, para. 2, Italian Civil Code). Moreover, in order to overcome the presumption of equal co-responsibility, it is also necessary to provide proof of the unpredictability of the conduct of the other driver.

⁹ Bertolini A. (2020). "Artificial Intelligence and Civil Liability", Study Requested by the JURI committee of the European Parliament, Policy Department for Citizens' Rights and Constitutional Affairs Directorate-General for Internal Policies, PE 621.926.

¹⁰ Bertolini A. (2013). "Robots as Products: The Case for a Realistic Analysis of Robotic Applications and Liability Rules" 5 (2) LIT: 214 ff., specifies that even fully autonomous vehicles are object and not subject of law. Precisely these are products created by the work of man in order to satisfy certain human needs and, therefore, in the event of a defect, the responsibility would be attributed to the producer of the same.

¹¹ Bertolini A., Palmerini E. (2014). "Regulating robotics: A challenge for Europe", Workshop for the JURI committee of the European Parliament, Policy Department for Citizens' Rights and Constitutional Affairs Directorate-General for Internal Policies: 112 ff., they clarify that the problem of liability in road traffic is perhaps the most relevant issue in relation to driverless cars, as it could have a strong technology-chilling effect, delaying their placing on the market.

such subjects must be recognized in the fact that the damage depends on the circulation of the vehicle, which it falls within the sphere of freedom of action of the owner and of the other mentioned subjects who, moreover, are those who can bear the economic loss of the road accident according to strict liability principle. Anyways, the driver, the owner, and the other subjects similar to them, have a right of recourse against the producer if the vehicle accident depended on a vehicle defect.

Another case of strict liability is that sets in paragraph 4 of the same article 2054 which provides, in fact, the objective responsibility of the driver and of the other persons indicated in the same article, in case of a construction defect or maintenance defect.

Concerning the product defect, i.e. the defect of the ADAS or driving software, the strict liability of the driver and of the owner (as well as of the other mentioned subjects) competes with the product liability, according to article 2055 of Italian Civil Code (even if the sources of liability are different: contractual and non-contractual liability). Product Liability was firstly regulated in Italy by the d.P.R., 24.05.1988, n. 224 that, pursuant to art. 15 of the law 16.04.1987, n. 183, implemented the Directive n. 85/374/EEC (so-called Product Liability Directive), relating to the approximation of the laws, regulations and administrative provisions of the Member States regarding liability for damage caused by defective products, and then repealed by d.lgs. 6.09.2005, n 206, (Italian Consumer Code), which at articles 114 and following, incorporates the provisions of the PLD.

More in details the art. 115, para 1, Italian Consumer Code (art. 2 PLD) defines as a product every movable, even if it is incorporated into another movables or immovables; therefore, fall within this category both the vehicles and the automatic devices installed on them. A product is to be considered defective, under art. 117 Italian Consumer Code (art. 6 PLD), when it does not offer the security that a person is entitled to expect taking into account the presentation of the product, the reasonable use of the product, and the time when the product was put into circulation. In fact, the assessment, to be carried out on a case-by-case basis, will take into account certain parameters which include those indicated by the art. 117 and 118 Italian Consumer Code (art. 6 and 7 PLD).

As can be seen from the definition of a defective product, the concept of defect is strictly connected to the concepts of safety of the person who uses it and of third parties. So, it is important to define if the safety standards represent a minimum or a maximum threshold of producer's liability. In general, in Italy safety standards are intended as minimal requirements, which merely allow the distribution of the product on the market. Indeed, as stated in the art. 118, lett. d), Italian Consumer Code (art. 7, lett. d), PLD), the liability is excluded only if the damage occurred because of the specific feature set by a legal rule. Furthermore, the existence of a higher level of safety standard, which has actually been achieved by other producers (so-called alternative design), may be suitable for configuring producer's liability even though he had respected the safety standards.

Having defined the notion of product and the one of defect, it is now necessary to understand what is meant by producer. About that art. 115, para.

2 *bis*, Italian Consumer Code (art. 3, para. 1 and 2, PDL), defines the producer of the finished product, that of a component part and also the producer of the raw material. Therefore, in the light of the existing EU legislation, a producer of an electronic device onboard the vehicle is a producer, as well as the producer of a vehicle, being it a traditional vehicle or a self-driving car. However, only the professional producer should be considered as a producer, on the basis of the fact that it is opposed to the consumer, the weak part of the relationship, which acts just like a non-professional.

Under art. 114 Italian Consumer Code (art.1 PLD), the producer is liable, regardless of his fault, for damages caused by his defective products (so-called strict liability or no-fault liability). The choice for the producer's strict liability derives from the fact of placing the risk on the subject who can better bear it because in the relationship between the producer and the consumer, the first one is economically stronger and also he can transfer (partially or integrally) the production costs and risks to the end-user, through the product's price.

With regard to the burden of proof, the art. 120, Italian Consumer Code, (art. 4 of the PLD) provides that the same is on the damaged party, which must prove the defect, the damage and the causal link between the defect and the damage, while the producer must prove the exemption of liability. The *ratio* of this rule limiting the liability of the producer is probably the indefectible need to protect also the strong party of the relationship, as it depends on him the innovation in the industrial sector and in particular that of new technologies. In fact, if the liability of the producer was even greater of that provided, he would not choose to introduce new technologies into the market as the same could result in excessive responsibility for him.

Coming to the insurance profile in Italy, mandatory insurance had already been established by article 1 of the law no. 990/1969 (no more in force),¹² for which every vehicle in public areas had to be protected by an insurance policy such as to cover the damages caused to third parties involved in a possible claim, up to a certain threshold. The compulsory insurance coverage fell only when the vehicle was demolished, with consequent radiation from the Public Automotive Registry.

The 1969 law has undergone various updates and modifications and has been definitively replaced by the current Italian Private Insurance Code, repeatedly modified. The Italian Private insurance code, in confirming the compulsory insurance, has also introduced a series of innovations, among which one of the most important is the direct compensation (article 149, Italian Private insurance code).¹³ It provides that, in specific cases, the injured person can go directly to his insurance company to get compensation for damages in case of an accident caused by the other party, without having to request the payment of damages to the company of the damaging party. This direct compensation procedure operates only if: (1) the motor vehicle accident occurred in Italy, in the Republic of San Marino or in the Vatican State;¹⁴ (2) it involved only two vehicles, both identified, insured and registered in Italy; (3)

¹² Law 24.12.1969, n. 990, civil liability insurance for road accidents (not in force).

¹³ Art. 18, Dir 2009/103/EC.

¹⁴ Art 34, par 1, CARD.

and if there has been damage to property and/or persons, but minor value.¹⁵ It seems clear, therefore, that this is an exception to the third party scheme, and that, when applicable, operates according to the scheme of the first-party insurance, even if the requirements are different and far more specific for the direct compensation than the first-party insurance.

In addition, can take advantage of the direct compensation only ones who are insured with an insurance company belonging to the Direct Compensation Agreement (DCA, in Italian CARD), pursuant to art. 13 of the D.P.R. n. 254/2006.^{16 17}

For damages caused by the insured to third parties, the insurance company, after collecting the insurance premium,¹⁸ it replaces the insured by paying the damages caused by him. The damages of which the driver is liable, and possibly also the other subjects expressly provided for in article 2054 of the Italian civil code, are those caused «to people or things». In the formula adopted, no distinction is made between people and things transported or not, but people and things transported are of course included also by Judicial Decisions.¹⁹ Moreover, if the damage derives from the collision with another vehicle, the person transported may also act against the other driver assuming an equal responsibility of the parties pursuant to article 2054, paragraph 2, Italian Civil Code. In addition, the third party is entitled, in the presence of a transport contract, to act against the driver for damages stemming from contractual civil liability, even in the absence of a tort claimed.²⁰

In case of autonomous vehicles, it is clear that the producer can bear the economic risk of damage, even better than the owner of the vehicle, in particular by providing an *ad hoc* professional insurance. In order to not distort the market and frustrate any car manufacturer which wishes to produce automated vehicles, the cost of the manufacturer insurance should be spread between the producer, who get the insurance coverage and the owner of the vehicle who pay the price of the vehicle, which is proportionally augmented covering a part of the insurance policy cost (but the owner effectively buy more performing vehicle even though more expensive).²¹

More concretely, up to level 3, and maybe 4, of driving automation, would operate the traditional insurance scheme, which foresees the insurance policy of the owner of the vehicle. Obviously, all producers have their own

¹⁵ Article. 149 Italian Private insurance code refers to the physical damage suffered by the non-responsible driver if it is contained within the limit set by article 139 Italian Private insurance.

¹⁶ D.P.R., 18.07.2006, n. 254, regulations governing the direct compensation for damages arising from road traffic.

¹⁷ In other words, these companies must establish a specific office, Company Service Reference Conventions Reference (SARC), for the management of the reports relating to the CARD between the member companies. The SARC also manages the relationships that derive from other agreements related to motor vehicle dealings, such as the Third-Party Transports Convention (CTT). Foreign insurance companies, on the other hand, must apply for membership of ANIA (Italian National Association of Insurance Companies) pursuant to Article 2 CARD.

¹⁸ The insurance premium is the amount that the insured corresponds to the insurance company to obtain insurance coverage.

¹⁹ In the past, on the contrary, a restrictive interpretation of the norm was preferred, for which people and goods transported as unrelated to vehicle circulation.

²⁰ In Italy, the transport contract is governed by articles 1678 ff., Italian Civil code.

²¹ According to an authoritative literature we could even talk about 'absolute liability' (which came from the common law legal system) that is even stricter than the objective liability, as there is the only proof that the fact was not unlawful.

professional insurance that is used to compensate the damage, if this derives from a defect of an ADAS or the software of the vehicle (as already happens for the defects of traditional vehicles). With the increasing of automation level and, therefore, of artificial intelligence, liability is more transferred to the producer. This is the case of automation level 4 and 5, where, however, the joint and several liability or the exclusive liability of the owner of the vehicle, called to compensate the damage with his own insurance, can be invoked.

In order to always guarantee damages to the injured person, then, it is necessary to provide for an *ad hoc* fund on which he or she can have recourse in a residual way, when it is not possible to identify the tortfeasor and/or his insurance. This fund should be European, since most vehicle accidents involve subjects or objects belonging to different Member States and are therefore cross-border. Moreover, the fund, so determined, could be increased by a government tax on autonomous vehicles and entrusted to the management of a specific insurance company, as already done for the so-called Guarantee Fund for Victims of the Road.²²

Once the analysis of the existing legislation in Italy on the liability of the driver, the owner and the subjects equivalent to him, as well as that of the liability of the producer is concluded, it appears clear that the same can be applied up to the intermediate automation level (up to level 3 of the SAE standard J3016).²³ However, for the subsequent levels of automation, a modification of the existing legislation or even the introduction of an *ad hoc* one should be provided.

In order to be able to assess which is the right way for regulating autonomous vehicles, it is necessary to test them on the road, as it is not possible to regulate a legal case that is not known.

For this reason, in Italy in 2017 with the introduction of the law of no. 205/2017 (Art 1, para 72), that authorised road testing of 'Smart Road' and connected driving solutions.²⁴ The text of the law called for the introduction of a decree of the Minister of Infrastructure and Transport for the implementation methods and operational tools of the experimentation.

For this reason, in 2018 was published the Ministerial Decree on smart road²⁵ that had a dual purpose. On the one hand, it aims to promote the technological adaptation of the infrastructures according to the 'Smart Roads rules', in line with the European and International requirements. On the other hand, the

²² The Guarantee Fund for Victims of the Road is a compensation body established in implementation of the Strasbourg Convention of 1959 and regulated by the Italian Private Insurance Code in order to compensate: (a) damage caused by an unidentified vehicle or boat; (b) damage caused by a vehicle or a boat identified but not covered by insurance; (c) damage caused by a vehicle or a boat that is insured with an insurance company that at the time of the accident is in a state of compulsory winding up; (d) damage caused by a vehicle placed in circulation against the owner's will (e.g. theft); (e) claims caused by vehicles sent to the territory of the Italian Republic by another State of the European Economic Area; (f) accidents caused by foreign vehicles with a licence plate that does not correspond or no longer corresponds to the same vehicle.

²³ SAE standard J3016, 'Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles' of 2014 (revised in 2016 and then in 2021, but the automation levels are the same). More details are available here: <https://www.sae.org/blog/sae-j3016-update>

²⁴ Italian Law of 27.12.2017, no. 205, available at www.normattiva.it.

²⁵ Ministero delle Infrastrutture e dei Trasporti, Decree of 28.02.2018, on the implementation methods and operational tools of road testing of Smart Road solutions and connected and automatic driving, available on www.gazzettaufficiale.it.

decree had the objective to guarantee and promote the autonomous and connected vehicles tests, in consideration of the possibility that autonomous vehicles will soon be introduced into the market. In particular, the Decree introduces the role of the supervisor (art 1, para 1, let. J and art. 10), starting from the assumption that in the highest automation level there is not a real driver but only a supervisor who must be able to resume the control of the vehicle if requested.²⁶

1.2 Homologation of self-driving cars.

Art. 46 of the Italian New Road Traffic Code qualifies: “*vehicles, all machines which can flow on the roads driven by men*”. Only vehicles that have this characteristic can be homologated according to the ordinary procedure of homologation, provided by art. 75-78, New Italian New Road Traffic Code as well as by Ministerial Decree 28.04.2008.²⁷

However, it should be noted that Italy signed the Vienna Convention of 1968²⁸ and therefore will be called upon to adapt to the new provisions which will be provided by the entering in force of the last amendment of the Vienna Convention, that will regulate the automated driving. In particular art. 46 of the New Italian Road Traffic Act (but in general should be revised part of the New Italian Road Traffic Act) should be modified in order to include the prevision of art. 34 *bis* of the Vienna Convention on the requirement according to which each vehicle must have a driver is considered satisfied when the vehicle uses an automatic driving system compliant with national technical regulations and any applicable international legal instrument and to the national legislation governing the functioning.

The ordinary procedure of homologation provides that the vehicles are subject to the verification of the identification data and their correspondence to the technical prescriptions and to the constructive and functional characteristics foreseen by the New Italian Insurance Code (art. 75, para. 1, New Italian Road Traffic Code). Furthermore, the Minister of Transport establishes with its own decrees specific rules for the national approval of systems, components and technical units, as well as the suitable procedures for their installation as elements of replacement or integration of vehicle parts, on types of cars (art. 75, para. 3 *bis*, New Italian Road Traffic Code). The assessment may concern single vehicles or groups of specimens of the same type of vehicle (art. 75 para. 2, New Italian Road Traffic Code).

In compliance with art 76, New Italian Road Traffic Code, the competent department of the Ministry of Transport after completing the assessment

²⁶ For a more in-depth analysis on the civil liability in relation to self-driving cars allow me to refer to Gaeta M.C. (2019), Liability rules and self-driving cars: the evolution of tort law in the light of new technologies, Napoli, Editoriale Scientifica (ES).

²⁷ Italian Ministerial Decree 28.04.2008, on the transposition of Directive 2007/46/EC of the European Parliament and of the Council of 5.09.2007, relating to the approval of motor vehicles and their trailers, as well as systems, components and technical units intended for such vehicles and repealing the Ministerial Decree 2.05.2001, no. 277, Provisions concerning the homologation procedures for motor vehicles, trailers, agricultural machinery, operating machinery and their systems, components and technical entities, available at www.gazzettaufficiale.it.

²⁸ Vienna Convention of Road Traffic of 8.11.1968

pursuant to art. 75, New Italian Road Traffic Code, issues the approval certificate to the vehicle manufacturer (or groups of the same vehicle).

After the issue of approval certificate certifying the existence of the eligibility requirements for circulation, the vehicles are subject to homologation, carried out on a vehicle prototype, according to the procedures established by Decree of the Ministry of Transport 28.04.2008. The same decree indicates the documentation that the interested party must exhibit in support of the application for approval (Article 75, paragraph 3).

Concerning autonomous vehicles, the possibility to be homologated according to the ordinary procedure, depends on the level of automations as classified by the SAE J3016 Standard of levels of driving automation).²⁹ Until level 2 of automation, the vehicle is driven by the men, so it is clear that traditional homologation rules can be applied to them. Coming to level 3 of automation, this is the first level of automation in which the driving software is driving itself, but the driver has to be able to resume the control of the vehicle if asked by the driving features. For this reason, it is possible to consider that ordinary homologation procedure can be applicable also for level 3 of automation. As a matter of fact, vehicles characterised by this level of automation are already on the market and has been homologated according to the ordinary procedure.

Some doubts about the applicability of the ordinary homologation procedure could arise with reference to level 4 of driving automation, in which the cases of human intervention are significantly reduced or completely eliminated. According to this thesis pedals and steering wheel should be installed, but part of the literature considers that already for level 4 of automation they are not mandatory. This means that the homologation procedure should provide more requirements for homologation, concerning ADAS and, in general, to driving software.

Having reached level 5 of automation, i.e. to completely autonomous vehicles it is not possible to apply the ordinary homologation procedure, because the figure of the human driver disappears.

This means that cannot be applied to fully autonomous vehicles (self-driving cars) in the definition by art. 46 of the new road traffic code, in particular because they are not driven by men. This implies that, currently, the autonomous vehicle cannot be homologated according to ordinary homologation procedure in force in Italy.

However, Italian legislation provides the approval of experimental vehicles, such as the automated vehicles (level 4 ad 5 of driving automation), which are still been tested in Italy, before their introduction on the market. In case of experimentation, the ordinary procedure can be passed by the art. 9, Ministerial Decree n. 277/2001. Indeed, a producer can ask the Italian Ministry of transport to do not applicate the legislation for the homologation “when the exception is required, for experimental reasons” (Art. 9, para 1, let b). The same article defines the homologation for experimental reasons as “temporary homologation” (Art. 9, para 2). Temporary homologation can eventually be

²⁹ SAE standard J3016, 'Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles' of 2014 (revised in 2016 and then in 2021, but the automation levels are the same). More details are available here: <https://www.sae.org/blog/sae-j3016-update>

turned in a final homologation if the experimentation gets positive results (art. 75, para 5, Italian Road Traffic Code).

Another way to obtain the homologation of a vehicle in Italy is to ensure that the vehicle gets the ordinary homologation in der country and then that is recognised in Italy, on condition of reciprocity. Therefore, ordinary homologation can be released to autonomous vehicles that gets the homologation in a Country where Italy recognises the homologations on condition of reciprocity (Art. 75, para 5, New Italian Road Traffic Code). However, there is still the issue of the circulation of these vehicles in Italy, when the autonomous driving mode is active, because the Italian legislation allows this mode of driving only for experimental purposes in the Smart Road Decree (D.M. 2802.2018).

Concerning the experimentation phase, according to art. 9, para 3, of the Ministerial Decree of 28.02.2018 (c.d. Smart Road Decree),³⁰ the approval for the experiments could be released only to the vehicles which already gets the homologation in the version without automated systems technology. The application for the authorisation must contain the documents listed in the art. 11, of the same D.M. 28.02.2018. Furthermore, the authorisation is issued for one or more vehicles, with reference to each of which the owner is indicated, belonging to the same class and category pursuant to art. 47 of the New Italian Road Traffic Code, equipped with automatic driving technologies, with similar functional performances and able to guarantee an identical level of safety on the road. Following the authorisation, the vehicles are entered in a special register kept by the authorising subject and are supplied with a special authorisation mark for experimentation (VGA standing for 'Veicolo sperimentale a guida autonoma'), the characteristics of which are set out in Annex B of the Smart Road Decree,³¹ which must be displayed on both the front and rear side of the vehicle, during the experimental activity (art. 9, para. 4, M.D. 28.02.2018).

³⁰ Italian Ministerial Decree 28.02.2018, Implementation methods and operational tools of road testing of Smart Road solutions and connected and automatic driving.

³¹ Annex B of the Ministerial Decree 28.02.2018 is available here: https://www.gazzettaufficiale.it/do/atto/serie_generale/caricaPdf?cdimg=18A0261900200010110001&dqu=2018-04-18&art.dataPubblicazioneGazzetta=2018-04-18&art.codiceRedazionale=18A02619&art.num=1&art.tiposerie=SG

	<p>VEICOLO SPERIMENTALE A GUIDA AUTOMATICA</p>  <p>Ministero delle Infrastrutture e dei Trasporti Dipartimento per i trasporti, la navigazione, gli affari generali e il personale Direzione Generale per la motorizzazione</p>
<p>Contrassegno numero:</p>	
<p>Scadenza:</p>	

Front side of the VGA - Annex B of the Smart Road Decree

<p>Ragione sociale del titolare dell'autorizzazione</p>	<p>Il presente contrassegno certifica che il veicolo è autorizzato a circolare sperimentalmente sulle strade pubbliche italiane, con le limitazione indicate nell'autorizzazione, ai sensi del decreto del Ministro delle infrastrutture e dei trasporti del 28 febbraio 2018</p>
<p>Autorizzazione n.</p>	
<p>Del:</p>	
<p>Numero di telaio del veicolo autorizzato:</p>	<p>Durante le prove sperimentali, il presente contrassegno deve essere apposto sia sul lato anteriore che in quello posteriore del veicolo in modo tale che il recto sia chiaramente visibile per i controlli</p>

Back side of the VGA - Annex B of the Smart Road Decree

The vehicles authorised for experimentation circulate, during the experimental activity, with a test licence plate issued pursuant to the decree of the Italian President of the Republic n. 474/2001 (art.9, para 5, M.D. 28.02.2008). The authorisation refers to the execution of experiments on one or more road areas, with the identification the specific road infrastructures indicated by the applicant after having obtained the authorisation from the entity that owns the road (Art. 9, para. 6, M.D. 02.28.2008).

Finally, with regard to the competent authorities for the authorisation of vehicles experimentation and their homologation, the competence has always been of the Ministry of Infrastructure and Transport. However, in the light of the goals of the European Union that aim at the development of sustainable technology, which is particularly important in the field of transport the Ministry of Infrastructure and Transport has become the Ministry of Infrastructure and Sustainable Mobility. (www.mit.gov.it).³² This is currently the competent authority in the homologation and testing of autonomous vehicles.

2. The use of autonomous vehicles.

2.1. Requirements applicable to the drivers of autonomous vehicles.

According to New Road Traffic Code, the requirements for the drivers of the traditional vehicles are stated by New Road Traffic Code and are two: (i) the driver must be suitable for physical and physiological requirements (art. 115, para. 1); (ii) the driver must comply with the age requirements that for driving a traditional car are 18 years old according to certain limits of weight as will see below (art. 115, para. 1, lett. c)).

The driving licence is provided by the New Road Traffic code which states that car licence B is needed for driving a car whose maximum authorized weight does not exceed 3.500 kg and it is designed and built to carry no more than eight people in addition to the driver (art. 116, par. 3, let. f).

The aforementioned requirements are the main requirements for driving traditional vehicles and it is believed that they can also be applied to semi-autonomous vehicles, up to level 2 of the driving automation level according to the SAE J3016 Standard of levels of driving automation. Indeed, according to SAE J3016 Standard of levels of driving automation the driver has the main lateral and longitudinal driving task and the ADAS constitute valid support for the driving activities. As expressly provided by the SAE International for levels 0, 1 and 2 of driving automation, the driver is driving the vehicle whenever the driver support features are engaged, even if he/her is off the pedals and is not steering. So, it is clear that for this minimum level of automation the driving task remain the same as the traditional vehicles and at the same way the driver requirement remains unchanged.

Reaching an intermediate level of automation, i.e. level 3 of automation the driver is not driving when the automated driving features are engaged, even if he/she is seated in the driving seat. However, in level 3 of automation are limited the cases in which the driving software is driving itself and, in any case, when the driving features request, the driver must drive the car. For this reason, is acceptable that for level 3 of automation the driver requirement remains unchanged, and this is also what is currently happening in the practice as vehicles with level 3 of automation are already on the market in Italy.

Contrariwise, it would be possible to consider an amendment of the driving license requirements for level 4 of vehicle automation in which the main

³² Prime Minister Decree (D.P.C.M.) 23.12.2020, n. 190, art. 6, no. 3, lett b), available at www.normattiva.it

longitudinal and lateral driving functions are entrusted to the vehicle and the driver has more a supervisor role. In level 4 of automation, indeed, the driver/supervisor must be able to understand driving technologies and interact with them according to the principles of the human-machine interface (HMI).

Anyhow, the current driver requirement cannot be applied to vehicles with level 5 of automation (self-driving cars), this kind of vehicles are known for the possibility of transporting people considered passenger of the vehicles not driver. For this reason, it is clear that the requirements for drivers cannot be applied to non-drivers. Furthermore, one of the strengths of autonomous vehicles is precisely that of being able to transport minors or people with physical or physiological disabilities and therefore they do not have the requirements of the driver as provided for by art. 115 of the New Italian Road Traffic Act.

Nevertheless, there are rules applicable by analogy to the vehicles level 5 of automation, such as the provision which requires to display the letter "P" on the rear side of the vehicle (stand as 'beginner') on the vehicle for the new drivers (art. 122, para 4, New Road Traffic Code). The same provision is also provided for the experimental autonomous vehicle which, according to art. 9, para. 4, M.D. 28.02.2018, should display the authorisation mark for experimentation (VGA standing for 'Veicolo sperimentale a guida autonoma') on the rear side of the vehicle.

The *ratio* is to advise other drivers to drive carefully in respect to the beginner. Equally, the automated vehicles should display the mark "AV" to advise other drivers that that vehicle is fully autonomous.

The need to affix the mark AV on the rear side of the vehicle would be necessary only until the complete transition to level 5 automation vehicles as at that level of automation they would communicate with each other via sensors and therefore it would no longer be necessary to affix AV.

Reaching this maximum level of automation also pedestrians would be aware that all vehicles on the road are self-driving and therefore it would not be necessary to indicate them the AV acronym.

2.2 Conditions permitting activation of the autonomous driving system.

The identification of the conditions that allow the activation of the automatic driving system depends on a preliminary analysis of the relationship between the driver and the vehicle, known as the human-machine interface (HMI) or, more precisely, a human-robot interaction (HRI) analysis.³³ This is a behavioural analysis based on the cognitive psychology of the relationship between man and the robot (the autonomous vehicle in the case of this report),

³³ The HRI, sub-category of the human-machine interface (HMI), is fundamental both for the identification of different levels of automation and for vehicle connection levels, since these are directly proportional to the increase in automation. On the basis of these behavioural studies it is possible to evaluate the effectiveness of the legislation and the adequacy of the protections it contains, drawing the necessary conclusions. For a more in-depth study of HMI see D Sidobre and others, 'Human-Robot Interaction', Siciliano B. (ed.), *Advanced Bimanual Manipulation*, in *Springer Tracts in Advanced Robotics*, LXXX (Springer 2012), 123 ff.. On cognitive law in general and on behavioural study in general see L Arnaudo, 'Diritto cognitivo. Prolegomeni a una ricerca' (2010) 1 *Politica del diritto* 101 ff.; B Lurger, 'Empiricism and Private Law: Behavioral Research as Part of a Legal-Empirical Governance Analysis and Form of New Legal Realism' [2014] *Aust Law Jour.* 19 ff..

and is part of the well-known human-machine interface (HMI) analysis. The results obtained by HRI analysis will have to be deepened from a legal point of view.

On the basis of the human-machine relationship (HMI or MRI), automation levels have been classified by several authors and usually all they are based on the level of onboard technologies intervention on human driving. However, in 2014 SAE International published the first international standard J3016 on driving automation, then revised in 2016 and again in 2021, which has defined six different automation levels. The automation levels identified by the SAE international standard are based on the level of driver's intervention in driving activities, which decreases proportionally as the vehicle's automation increases. They are: (L0) no automation, (L1) driver assistance, (L2) partial automation, (L3) conditional automation, (L4) high automation e (L5) full automation.

In the level zero (L0) there is no automation but the driver constantly has the control of the vehicle; however, the vehicle is equipped with 'driver assistance' systems which helps the driver.³⁴ In level one of automation (L1), i.e. 'assisted automation', also called 'hands on', driver continuously perform longitudinal and lateral driving tasks, and the few residual skills are performed by the vehicle.³⁵ In 'partial automation' or 'hands off' (L2) the driver have to monitored the dynamic driving task and the driving environment at all time.³⁶ Level three of automation (L3), is the 'conditional automation' or 'eye off' level, where in time the vehicle system requires the driver to take the control when it is necessary; it means that the driver does not need to monitor the vehicle driving task (e.g. in L3 driver can send a message or eat a meal) and the surrounding environment at all times, but he /she has to be able to resume the control of the vehicle when is asked by the driving.³⁷ 'High automation' (L4) is the immediate development of 'conditional automation' level and follow the same division of driving tasks between the driving system and the driver; the difference lies in the fact that the cases in which the driver must intervene are reduced only to anomalous cases (i.e. in L4 driver can watch a movie and even sleep).³⁸ According to this thesis pedals and steering wheel should be installed, but part of the literature consider that already for level 4 of automation they are not mandatory. Finally, in 'full automation' level (L5) all the tasks are performed by the vehicle and no driver is requested. For this reason, in level five of automation the role of the driver disappears completely.³⁹

³⁴ Examples of 'driver assistance' for level 0 of the SAE Standard J3016 are: automatic emergency breaking, blind-spot warning, lane departure warning, cruise control.

³⁵ Examples of 'assisted automation' for level 1 of the SAE Standard J3016 are: lane centering or adaptive cruise control.

³⁶ Examples of 'partial automation' for level 2 of the SAE Standard J3016 is lane centering and adaptive cruise control at the same time.

³⁷ Example of 'conditional automation' for level 3 of the SAE Standard J3016 is the traffic jam chauffeur. A concrete vehicle characterized by 'conditional automation' is Audi A8 Luxury Sedan. This car is equipped with Traffic Jam Pilot, that takes full control of all aspects of driving in slow-moving traffic at up to 60 kilometres per hour. This driving function works only on highways with a physical barrier separating one stream of traffic from oncoming traffic.

³⁸ Example of 'high automation' for level 4 of the SAE Standard J3016 is local driverless taxi.

³⁹ Example of 'full automation' for level 5 of the SAE Standard J3016 are the same as level 4 but the driving feature can drive everywhere in all conditions.

Thus analysed the relationship between the driver and the vehicle, it is possible to investigate the condition permitting the activation of the automated driving system, as well as the obligations of the driver/supervisor of the autonomous vehicle when the driving system is active, in relation to the high level of automation (i.e. level 4 and 5 of driving automation).

About the condition permitting the activation of the automated driving system, currently the Italian legislation does not provide a specific regulation concerning the activation of driving systems. Indeed, in practice, in Italy is allowed the activation of the automated driving system up to level 2 of automation according to the traditional circulation of vehicles. For level 3 of automation, there are both structural limitations of the vehicle and limitations relating to road characteristics. About the first point, the vehicle can drive in autonomous mode only within 60 km/h; with regard to the second point, the vehicle can drive in this mode only on certain roads. Indeed, the vehicle with level 3 of automation should be compliant with the international standard UN-ECE R-157,⁴⁰ in force since 2021, which for the moment allows vehicles equipped with this technology to drive in automatic mode only on separate carriageways without pedestrians or cyclists, without exceeding 60 km/h. The data stored in the navigators' maps unlock the system when they recognize that they are on an allowable stretch and speed. When these sections end, or in the presence of danger, the ADAS inform the driver to resume the control of the vehicle and, failing that, pull over and stop the vehicle. However, this technology is only permitted if it complies with the laws of the country in which the vehicle is to be used and Italy does not have adequate legislation for level 3 automation.

For the high level of vehicle automation (levels 4 and 5), there is not a regulation on conditions permitting their activation but currently their circulation is admitted only for experimental purposes in specific smart roads equipped with adequate technical infrastructure.

With regard to the obligations of the driver of the autonomous vehicle, a first distinction should be made between the cases in which the vehicle is driven by the driver, and that in which the vehicle is driven by the driving system. In the first cases the driver should comply with the obligation provided for the traditional driving that are stated by Title V of the New Italian Road Traffic Code (art. 140 - 193). Reaching a medium level of automation, i.e. level 3, it is desirable that further obligations are foreseen for the driver in addition to the traditional one, relating to his/her interaction with the ADAS and their understanding. This means that these further obligations should be related to the role of the supervisor that has the function to supervise the driving task performed by the vehicle driving system.

For level 4 of automation and, of course for level 5 of automation, the obligation should change and should be more related to the supervision of the vehicle and to the role of the passenger onboard the vehicle.

Nowadays in Italy a specific regulation on autonomous vehicles is foreseen only as part of the experimentation of the same in testing situations. It is the

⁴⁰ More information on international standard UN-ECE R-157 are available here: <https://unece.org/sustainable-development/press/un-regulation-automated-lane-keeping-systems-alks-extended-trucks>

D.M. 20.02.2018 on the implementation methods and operational tools of the on-road testing of smart road and connected and automatic driving solutions⁴¹ This regulation can be used as a basic provision to be applied by analogy also in the cases of non-experimentation, obviously with the necessary precautions that differentiate the two cases and that the legislator must consider when will provide for regulation for autonomous vehicles in Italy.

More in detail, concerning the condition permitting the activation of the automated driving system, art. 12 of the Smart Road Decree, states the characteristics of autonomous driving for the admission to testing: (a) guarantee, in all conditions, compliance with the rules referred to in Title V of the New Italian Road Traffic Code and, in general, operate in such a way as to do not constitute a danger or hindrance to traffic; (b) be able to interact safely with all possible road users, including the weakest and most vulnerable users such as people with reduced mobility or disabilities, children, pedestrians, cyclists and motorcyclists; (c) be suitable at all times to allow the switch from the automatic mode to the manual mode, on the action of the supervisor; (d) be equipped with intrinsic safety protections suitable for guarantee data integrity and communication security, as well as to prevent unauthorised access and, in any case, neutralise its harmful or dangerous effects; (e) be able, for the entire duration of the tests, to record detailed data with a frequency of at least ten hertz and such from include at least: (1) time elapsed since the beginning of the recording, coinciding with the beginning of the experimentation; (2) automatic or manual current driving mode; (3) date, time, position in WGS84 coordinates and instantaneous speed; (4) instantaneous acceleration; (5) distance travelled from the start of the trial; (6) activation of commands for the lateral dynamics of the vehicle; (7) activation of commands for the longitudinal dynamics of the vehicle; (8) number of revolutions per minute of the engine, or other indicator equivalent; (9) gear ratio engaged, or other equivalent indicator; (10) current value of the yaw, roll and pitch angle; (11) use of lighting and signalling devices visual and acoustic; (12) data acquired from the sensors forming part of the object system evidence; (13) any V2V and V2I messages received and transmitted.

About the driver/supervisor requirement, art. 10 of the Smart Road Decree provide specific requirements for the role of the supervisor that should be added, if applicable, to the provision of Title V of the New Italian Road Traffic Code. The requirement provided by art. 10 of the Smart Road Decree are: (i) have the driving license for at least 5 years, (ii) has successfully passed a safe driving course or a specific course for self-driving vehicle experimenters at an accredited body in one of the countries of the European Union, (iii) has conducted tests on automated vehicles in a protected site or on a public road, even abroad, as long as in a State where the testing of automated vehicles is regulated, for a mileage of at least one thousand kilometres, and (iv) possesses the necessary knowledge, adequately documented, to take part in the tests as a supervisor (art. 10, para 1, D.M. 20.02.2018). Furthermore, the supervisor must be able to promptly switch between driving in automatic mode to driving in manual mode and vice versa supervisor (art. 10, para 2, D.M. 20.02.2018).

⁴¹ Italian Decree 28.02.2018, Implementation methods and operational tools of the on-road testing of Smart Road and connected and automatic driving solutions

2.3. Conditions for using driverless vehicles.

The conditions for using autonomous vehicles on the public roads are strictly related to the development of adequate driving infrastructures in order to be able to appropriately implement the three types of driving connection currently existing: vehicle to device communication (V2D); vehicle to infrastructure communication (V2I); vehicle to vehicle communication (V2V).

Autonomous vehicles are often defined as connected and automated vehicles to emphasize their ability to connect to the network. In some limited cases the connection can take place via Bluetooth, (e.g. communication between the vehicle and a smartphone), but most of the communications require an Internet connection. In fact, through the internet connection, vehicles can be put in communication with devices (eg. smartphones), with the same infrastructures (eg. traffic lights) and with other (semi) autonomous vehicles. The level of vehicle communication is directly proportional to the level of automation of the vehicles, even though connectivity is just one of the requisites needed to achieve complete automation of vehicles.

Internet development has been greatly enhanced by the extension of this network to the world of objects, a phenomenon known as the Internet of Things (IoT). It is an evolution of the Internet network, thanks to which the objects interact with each other, through sensors and without human intervention, exchanging data and accessing information stored in databases. This information architecture has been defined as a network that connects physical or virtual objects that become recognisable and acquire intelligence through the ability to communicate data about oneself and on the environment around them. For this reason, such objects are defined as intelligent objects. Currently included in this category are incredibly disparate kinds of objects, including ADAS or driving software. Today there are so many smart things that the concept has moved from "Internet of Things" (IoT) to "Internet of Everything" (IoE, that applied to autonomous vehicles domain is Vehicle to Everything - V2X).⁴²

In this regard, on 28.02.2018 has been published the Smart Road Decree⁴³ According to art. 3 the Smart Road Decree aims to promote the enhancement of the existing infrastructural assets, the construction of useful infrastructures, the technological adaptation of the national road network in line with the European and international framework of digitization of road infrastructures, also in support of connected automated vehicles, as well as reducing road accidents and ensuring continuity with the European cooperative intelligent transportation system (C-ITS). This digital transformation process is applied to the road infrastructures of the Trans-European Network - Transport (TEN-T), as well as to new infrastructures connecting elements of the TEN-T network, and progressively to all the infrastructures belonging to the first level of the National Integrated Transport System (SNIT), according to the timing and procedures set out in the Smart Road Decree (art. 4, Smart Road Decree).

⁴² CISCO, 'The Internet of Everything. Global Public Sector Economic Analysis', https://www.cisco.com/c/dam/en_us/about/business-insights/docs/ioe-value-at-stake-public-sector-analysis-faq.pdf.

⁴³ Smart Road Ministerial Decree 28.02.2018, Smart Road Decree, available at www.normattiva.it.

More in details on transport infrastructure, art. 6 of the Smart Road Decree provides that the functional specifications of the digital transformation process of the Smart Roads, are identified in paragraph 4, Table 1, of Annex A⁴⁴ and are to be implemented in accordance with Sections A to C, referred to the same Annex A. Moreover, these functional specifications are subject to updates and revisions by decree of the Minister of Transport (Now Ministry of Infrastructure and sustainable mobility), and with the technical support of the Observatory established pursuant to art. 20 of the Smart Road Decree (M.D. 28.02.2018).⁴⁵

ID	Specific Functional Description
1	Road-side presence of communication network with high level of bit-rate (optical fiber).
2	Continuous coverage of the road axis and related appurtenances with connection services for the IoT and routing to the data communication network.
3	Road-Side Unit for V2I communication, located in a way that allows connection to vehicles equipped with On-board-unit V2X that meet industry standards.
4	Presence of a Wi-Fi hot-spot system for the connectivity of personal devices, located at least in the service and parking areas (if any).
5	Traffic detection and enforcement system, as well as detection of outflow conditions, developed on a higher-level detail for type I smart roads, regarding with the descriptions in Section A (detection of traffic and flow conditions): the survey system must have the minimum characteristics of the measurements and comply with the qualification rules described in Section A; the system must be designed in a way that minimizes its ecological and energy impact.
6	Data archiving system from the detection of traffic and flow conditions with archiving functions and historicization, according to the specifications of Section A (detection of traffic and flow conditions), in compliance with the legislation on privacy and data protection.
7	Provision of a modeling system for the forecast of medium-short term flow conditions, as well as for the estimate/forecast for subsequent time periods, regarding with the specifications of Section A detection of traffic and flow conditions).
8	A real-time monitoring system for climatic and rain conditions, as detailed in Section B (Monitoring hydro/weather); the system must be designed in a way that minimizes its ecological and energy impact.

⁴⁴ Annex A of the D.M. 28.02.2018 is available at this link: https://www.gazzettaufficiale.it/do/atto/serie_generale/caricaPdf?cdimq=18A0261900100010110001&dgu=2018-04-18&art.dataPubblicazioneGazzetta=2018-04-18&art.codiceRedazionale=18A02619&art.num=1&art.tiposerie=SG

⁴⁵ According to art. 20 of Smart Road Decree, in order to promote the digital transformation process toward Smart Roads and activities aimed at experimenting and developing connected and automated vehicles, at the General Direction for information and statisticians systems of the Ministry of Infrastructure and Transport (Now Ministry of infrastructure and sustainable mobility) is established the 'Technical Support Observatory for Smart Roads and for the connected and automated vehicle'.

9	Ability, based on traffic detection data and forecasting models, to offer content for advanced travel information services to users, allowing any re-routing actions; the transmission of information can take place using V2I communication systems, if permitted by current standards and equipment, or through web app.
10	Real-time control from a traffic center equipped with management support programs as indicated in section C (ITS advanced services), which include the ability to apply pre-established traffic management scenarios (and object to impact simulation) selected and implemented dynamically based on traffic data and other information received from sources, including heterogeneous ones; scenarios can predict mix of possible measures such as: deviations of flows, in case of serious obstructions; interventions on average speeds, to avoid or solve congestion (speed control); suggestion of trajectories and lanes (lane control); dynamic access management (ramp metering).
11	Ability to provide road users, especially professional drivers and company fleets, on request, with parking management services and refueling (with particular reference to electric charging).
12	Ability to provide, based on the static and dynamic characteristics of the infrastructures, relevant traffic data, medium and short-term estimates of flow conditions, of the hydro/weather monitoring system and of any specific models and algorithms, C-ITS type services according to the specifications referred to in Section C3 (Advanced Services of type C-ITS); in the first instance, the services must be able to be used at least by vehicles service of the management/concessionaire body of the smart-road, as well as by heavy vehicles in transit and equipped on board with V2X communication systems.

General List of the Smart Road functional specification – Annex A of the Smart Road Decree
(English translation)

Furthermore, art. 7 of the Smart Road Decree states that the implementation of functional features applies to all the newly built infrastructures, or those being upgraded for which the preliminary project has not yet been approved at the date of entry into force of the smart road decree and falling within the scope of the application referred to in art. 4 of the same decree. The implementation also applies to infrastructure existing if they are objects of technological innovation interventions.

Finally, it is important to underline that the art. 8 regulates the costs relating to the implementations. These costs are borne by the infrastructure concessionaire, the service concessionaire or, in the absence of the previous figures, the managing body in a different capacity, and are to be considered as investment costs, recognised upon request and according to the regulations and procedures in force. under the relevant conventions, concessions or service concessions.

The Smart Road Decree provisions can be applied by analogy to the general condition for using autonomous vehicles. As a matter of fact, the requirement

provided by the Decree should as basically provisions for the development of road infrastructures, allowing the most adequate growth of autonomous and connected driving. This development of infrastructures is part of the largest phenomenon of the development of smart cities which is increasingly important in contemporary society. We need not only smart mobility but more in general smart roads and smart cities to prepare an appropriate operating environment for AV.

As part of the development of adequate infrastructures to encourage autonomous and connected driving, a significative Italian initiative was the signature of the Memorandum of Understanding between the Ministry for Technological Innovation and Digitization, and the Ministry for Infrastructure and Transport, on May 2020.⁴⁶ The aim of the memorandum of understanding was the development of innovative mobility through research and testing of automated and connected vehicle (CAD). The memorandum, indeed, aims to develop and support applied research, experimentation and prototyping, production and training of new professionals in the field of innovative vehicles, as well as the interest in creating services with a social impact for the Country. The agreement also supports and encourages collaboration and partnership between public institutions, companies, universities and research bodies in these fields.

Following these initiatives, the most recent programme on autonomous driving experimentation has been launched on 17 February 2022 as a result of the collaboration between the Italian Department for Digital Transformation,⁴⁷ the Italian Ministry of Economic Development⁴⁸ and the Italian Ministry of infrastructures and sustainable mobility.⁴⁹

The programme is entitled 'Experimentation Italy'⁵⁰ and its object is the experimentation of a fleet of self-driving shuttles on the road in Turin. The programme represents the regulatory sandbox that allows start-ups, companies, universities, and research centres to experiment with innovative projects through a temporary derogation from current regulations.

'Experimentation Italy' programme aims to make Italy an innovation laboratory by opening the doors to the application of emerging technologies,

⁴⁶ Ministero per l'Innovazione tecnologica e la Digitalizzazione e Ministero delle Infrastrutture e dei Trasporti, Protocollo d'intesa in materia di innovazione per la guida autonoma e connessa in ambito urbano ed extraurbano, available at https://www.mit.gov.it/sites/default/files/media/notizia/2020-05/Guida_Autonoma_MID_MIT_.pdf. Still on the topic of innovation, but not strictly on autonomous vehicles, we report: Working Group on Artificial Intelligence and Blockchain, appointed by the Ministero dello Sviluppo Economico Italiano (MISE), Proposte per una strategia italiana per l'intelligenza artificiale, 2019; Ministro dell'Innovazione tecnologica e della digitalizzazione, Strategia per l'innovazione tecnologica e la digitalizzazione del Paese 2025, 2020.

⁴⁷ The Italian Department for Digital Transformation is the support structure for the Italian Ministry for Technological Innovation and Digital Transition for the promotion and coordination of the Government's actions aimed at defining a unitary strategy in the field of Italian digital transformation and modernisation through digital technologies. Webpage of the Department for Digital transformation: <https://innovazione.gov.it/dipartimento/la-struttura/>

⁴⁸ Website of the Italian Ministry of Economic Development www.mise.gov.it

⁴⁹ Website of the Italian Ministry of infrastructures and sustainable mobility www.mit.gov.it

⁵⁰ The authorisation for the experiment was obtained from the Turin Transport Group (GTT) and takes place within the SHOW project, funded by the European Horizon2020 program, which aims to support the transition to an effective and sustainable self-driving urban transport. More details on the Experimental Italy Programme are available at: <https://www.mit.gov.it/comunicazione/news/innovazione-libera-alla-sperimentazione-di-navette-guida-autonoma-su-strada>

for the benefit of citizens, businesses and public administration. In the event of successful trials, thanks to the data collected, a regulatory change may be proposed to allow the innovations to become replicable throughout the national territory.

3. Data protection and the processing of personal data by autonomous driving systems.

3.1. The data collected and processed.

Personal data are regulated under General Data Protection Regulation (Reg. 2016/679/UE),⁵¹ implemented in Italy by d.lgs. no. 101/2018,⁵² that amended the Italian Privacy Code (D.lgs. no. 196/2003).⁵³ Concerning no personal data, on 23 February 2022 has been published the Regulation Proposal Data Act on fair access to and use of data,⁵⁴ as one of the proposals part of the European strategy for data.⁵⁵ Considering the growing importance of data for society and the economy, the European strategy for data aims at creating a single market for data that will ensure Europe's global competitiveness and data sovereignty protecting individuals.

Coming to soft law acts, it is important to mention the European Data Protection Board (EDPB) Guidelines no. 01/2020 on processing personal data in the context of connected vehicles and mobility-related applications.⁵⁶

Currently, vehicles can process data. Indeed, it is clear that the connectivity of these vehicles results in the collection, processing, and transfer of personal data. More precisely, manufacturers can collect data not only on the performance of their products (which also makes it possible to quickly detect a malfunction and determine liability in case of a car accident) but also users' personal information, who are often unaware of this processing of their personal data.⁵⁷ In addition, this data may be intercepted by third parties who use or sell it for diverse purposes.

⁵¹ Regulation of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC, 2016/679/UE, (General Data Protection Regulation - GDPR), available at www.eur-lex.europa.eu

⁵² Italian legislative decree 10.08.2018, n. 101, Provisions for the adaptation of national legislation to the provisions of regulation (EU) 2016/679 of the European Parliament and of the Council, of 27 April 2016, relating to the protection of individuals with regard to the processing of personal data, as well as the free circulation of such data and repealing Directive 95/46/EC (General Data Protection Regulation), available at www.normattiva.it.

⁵³ See footnote no. 6.

⁵⁴ Proposal for a Regulation of the European Parliament and of the Council on harmonized rules on fair access to and use of data (Data Act), 23.02.2022 COM (2022) 68 final

⁵⁵ More details on the European Strategy for data are available on the official web page: <https://digital-strategy.ec.europa.eu/en/policies/strategy-data#:~:text=Strategy%20for%20data-,A%20European%20Strategy%20for%20data,and%20societal%20progress%20in%20general.>

⁵⁶ European Data Protection Board (EDPB) Guidelines no. 01/2020 on processing personal data in the context of connected vehicles and mobility related applications, 9.02.2021, available at www.edpb.europa.eu.

⁵⁷ For an analysis on the unawares of the users in relation to the processing of their personal data through new technologies see Gatt L., Montanari R., Caggiano I.A., eds. (2021). Privacy and Consent. A Legal and UX&HMI Approach. Naples, University Suor Orsola Press.

The data processed can be personal data or non-personal data, including data generated directly by the automated and connected vehicles (metadata). A typical example of personal data (art. 4, para. 1, let 1), GDPR) processed are identification and contact data of the driver and passengers onboard the vehicle. The personal data also includes particular categories of data (art. 9 GDPR) such as data relating to the driver's state of health. Moreover, vehicles are able to carry out automated processing of different types of personal data related to the drivers through specific algorithms, creating their detailed profile, i.e. profiling process (art. 22 GDPR), such as driver localisation. Finally, in addition to personal data, non-personal data are also processed, and can also be generated directly by the vehicle itself, such as those relating to the active driving mode and speed of the vehicle.

About the analysis of the data processed by self-driving cars, already before the GDPR, the Article 29 Data Protection Working Party (Article 29 WP)⁵⁸ in 2014 adopted an opinion aimed at finding solutions that enforce privacy protection rules also in the Internet of Things.⁵⁹ Based on a typical Law and economics approach, the Article 29 WP compared citizens' interests to the protection of their personal data and those of companies operating in this sector, who receive significant economic benefits from the spread of IoT, trying to dictate guidelines to extend the existing European legislation on data protection to smart things as well.

Then, in order to define and analyse the IoT phenomenon, the Global Privacy Enforcement Network (GPEN)⁶⁰ has launched Privacy Sweep 2016. It is an international survey to verify respect for privacy and data protection on the IoT field, strengthening cooperation between the Data Protection Authorities of the twenty-six countries of the world who have joined the initiative.⁶¹ The investigation ended on 22 September 2016, with worrying results. In fact, more than 60% of smart things have not passed the GPEN test.

The Italian Data Protection Authority (Garante per la Protezione dei Dati Personali)⁶² is studying the phenomena of the IoT and all the main relevant documents on the topics are available on its dedicated webpage, constantly updated, with an overview on the Italian and European initiatives.⁶³ At the same time the Italian DPA is also monitoring the field of artificial intelligence with particular regard to data protection aspects.⁶⁴

⁵⁸ Article 29 Data Protection Working Party (Art. 29 WP) was established by art. 29, Directive 95/46/CE and currently replaced by European Data Protection Board (EDPB).

⁵⁹ Art. 29 WP, Opinion 8/2014 of 16 September 2014 on the on Recent Developments on the Internet of Things [2014] 10 ff., which refers to Wearable Computing, Quantified Self and demotics, but it appears to be applicable to any area of IoT.

⁶⁰ In 2007, the Council of the Organisation for Economic Co-operation and Development (OECD) adopted the Recommendation on Cross-border Cooperation in the Enforcement of Laws Protecting Privacy. The Recommendation imposed on OECD member states the goal of creating an informal network of Personal Data Protection Authorities, from which the Global Privacy Enforcement Network (GPEN) was born.

⁶¹ For more details on Privacy Sweep 2016, included results www.privacyenforcement.net

⁶² All the information on Garante per la Protezione dei Dati Personali, are available on its official website: www.garanteprivacy.it

⁶³ Webpage on Internet of Things edited by Garante per la Protezione dei Dati Personali <https://www.garanteprivacy.it/temi/iot>

⁶⁴ Webpage on Artificial Intelligence edited by Garante per la Protezione dei Dati Personali: <https://www.garanteprivacy.it/temi/intelligenza-artificiale>

With specific regard to self-driving cars, research commissioned by the Fédération Internationale de l'Automobile (FIA), focusing on the flow of data exchanged between cars and their respective manufacturers, revealed the quantity and quality of data that last-generation vehicles are able to exchange.⁶⁵ Additionally, based on the results of this research, FAI launched the My Car My Data project⁶⁶ to raise awareness about the processing of personal data and the need to introduce specific legislation.

3.2. Storage and access to the data.

Also, for personal data storage the legislation applicable is the GDPR, as well as the EDPB Guidelines 1/2020.⁶⁷ At these two regulations, respectively, the first of Hard Law and the secondo of Soft Law, is added the ePrivacy Directive⁶⁸ which will be replaced by the new ePrivacy Regulation,⁶⁹ when it will enter in force. The ePrivacy Directive has been implemented in Italy by Italian Legislative Decree 28.05.2012, no. 69,⁷⁰ that has amended the Italian Privacy Code art. 121-134.

In particular, the ePrivacy Directive establishes a specific standard for all subjects who intend to store and access information stored in the terminal equipment of a user in the European Economic Area (EEA). Connected and autonomous vehicles (CAD), as well as all intelligent systems connected to them must be considered as terminal equipment and therefore the ePrivacy Directive is applicable to them. Indeed, personal data can be processed by autonomous vehicles and could be stored on the operating systems of the autonomous vehicles themselves or on external software (e.g. cloud computing infrastructures).

Concerning personal data processing, it should be regulated in compliance with GDPR. More in detail this processing is lawful when is compliant with art. 6, 9 and 22 GDPR. As underlined by the EDPB in the Opinion 5/2019 on the interaction between the ePrivacy Directive and the GDPR,⁷¹ the consent of the data subject is required for the storage of data as well as for access to data

⁶⁵ 'FIA Reveals what data is being tracked and how the public reacts to connected cars' (2015) <https://www.fia.com/news/fia-reveals-what-data-being-tracked-and-how-public-reacts-connected-cars>.

⁶⁶ Website of MyCar My Data Project www.mycarmydata.org

⁶⁷ European Data Protection Board (EDPB) Guidelines no. 01/2020 on processing personal data in the context of connected vehicles and mobility related applications, 9.02.2021, available at www.edpb.europa.eu

⁶⁸ Directive of the European Parliament and of the Council of 12.07.2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications), 2002/58/EC, available at www.eur-lex.europa.eu

⁶⁹ Proposal for a Regulation of the European Parliament and of the Council concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC (Regulation on Privacy and Electronic Communications), SWD (2017) 6 final, amended on 10.02.2021.

⁷⁰ Italian Legislative decree 28.05.2012, no. 69, Amendments to the legislative decree 30.06.2003, n. 196, containing the Italian Data Protection Code, in implementation of directives 2009/136/EC, regarding the processing of personal data and privacy protection in the electronic communications sector, and 2009/140/EC in the field of networks and services of electronic communication and of Regulation (EC) no. 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection legislation, available at www.normattiva.it

⁷¹ EDPB Opinion 5/2019 on the interplay between the ePrivacy Directive and the GDPR, in particular regarding the competence, tasks and powers of data protection authorities 12.03.2019 1, available at www.edpb.europa.eu.

already stored. Concerning personal data, data subject's consent constitutes the more common lawful basis for processing (Art 6 GDPR), while for personal data that in addition falls into one of the categories listed in art 9 GDPR (i.e. sensitive data), consent is an exception to the general prohibition of processing data of that kind. The same regime of exception is applicable to automated processing according to art. 22 GDPR, which are prohibited as a general rule, and the data subject's consent constitute an exception to the rule. These are the most common but not the only legal bases for lawful processing, for which reference is made to a more in-depth analysis of the data protection legislation.

In any case, the consent must be informed and, therefore, preceded by adequate information on the processing of personal data provided pursuant to art. 13 and 14 GDPR. Data subjects should in fact be informed and enabled to control the way in which their data are collected and processed by the vehicle. The information should be provided in the data subject's language, only strictly necessary data should be processed by default, data should not be transmitted to unauthorised third parties, data must be kept only for the time necessary, the data subject should be able to permanently delete all personal data before the vehicles are put up for sale and should have direct access to the data generated by the applications driving vehicle software. In general, data subjects must be able to exercise all the rights expressly provided for them by the GDPR (art. 12- 21 GDPR).

Furthermore, considering the volume and diversity of personal data processed, the EDPB Guidelines 1/2020 underlines that data controllers must be required to ensure that the technologies used in the context of connected vehicles are configured in compliance with the principles of privacy by design and by default, pursuant to Art. 25 GDPR. In particular, technologies should be designed to minimize the collection of personal data provide default privacy protection settings and ensure that data subjects are well informed and have the ability to easily change associated configurations and their personal data. More in general Data Controllers should adopt the measures to guarantee the security and confidentiality of the data and all the necessary precautions (e.g. encryption).

Concerning the parties authorised to access to personal data of the driver and of the passenger on board the vehicle, they are the Data Controller, the Data Processor and third parties, as well as subjects authorized by them. In particular, the figure of Data Controller includes both the manufacturer of the vehicle and the manufacturer of the intelligent devices of the same as well as the provider of the cloud computing in which the data is saved and in general the provider of the infrastructures through which the vehicles are connected and process personal data.

The data must be stored in compliance with GDPR, guaranteeing access to them only by authorised parties as, for example, the insurance company, public authorities, vehicle dealership or other maintenance person called to perform a technical intervention on the vehicle. These subjects certainly need to access some personal data but under certain conditions and only about data necessary for the performance of a specific task. On the contrary, personal data stored could not be accessible by unauthorised parties, who could unlawfully process these data by entering in the autonomous vehicle and using the onboard

computer. At the same time, the same personal data could be processed unlawfully by third parties capable of hacking the driving system or the external cloud-computing containing personal data.

Therefore, the authorised/legitimated subjects may have access to the data according to GDPR lawful basis. In particular, the insurance company, as well as vehicle dealership or other maintenance person called to perform a technical intervention, are previously authorised by the data subject through express consent (Art. 6, lett. a), GDPR); furthermore, they are also authorised to use and access the data for the performance of the contract of which the interested party is a party (Art. 6, lett. b), GDPR). As for the competent authorities, they can access the data for public interest or in the exercise of official authority (Art. 6, lett. e), GDPR).

Finally, if the data must necessarily be transferred to third parties, it would be advisable to evaluate the possibility of anonymising them where possible, since anonymous data are not considered personal and therefore cannot cause any damage to the individual to whom the data belongs, maintain the benefits and minimise the risks in relation to related vehicles.

When it is not possible to anonymise the data, the possibility of pseudo-anonymisation (art. 25 GDPR) can still be evaluated. In this case, the data is in any case a personal data in which the interested party can be identified and must be governed according to the GDPR, but in any case, it is a greater protection for the data subject.

3.3. Deletion of the personal data.

Also, the deletion of data is regulated under GDPR. However, it does not establish the retention times for the data controller. According to the accountability principle, it is up to the owner to identify and legitimize a period of time deemed compliant, also through references to criteria dictated by sectoral standards or practices.

The important thing is that the principles of data minimization and therefore conservation limitation established in art. 5 of the GDPR are applied.

Furthermore, personal data must be kept in a form that allows the identification of the data subjects for a period of time not exceeding the achievement of the purposes for which they are processed. However, personal data may also be kept for longer periods if they are processed exclusively for archiving purposes in the public interest, for scientific or historical research or for statistical purposes, in compliance with art. 89, para. 1, GDPR. At the same time the so-called 'conservation limitation' provides that the conservations should be made without prejudice to the implementation of technical and organizational measures required by GDPR to protect the rights and freedoms of the data subject

In this regard, Recital 39 GDPR states that it is necessary to define a deadline for the cancellation of personal data stored but also for periodic verification.

The legislator is therefore very clear: the data must be processed for the shortest possible time. This period must consider the reasons why the organization must process the data, as well as any legal obligations for the

retention of the personal data for a specific period (for example national labor, tax or anti-fraud laws).

Moreover, the terms of data retention must be consistent with the contents of the information provided by art. 13 GDPR, which indicates also the retention period of personal data or, if this is not possible, the criteria used to determine this period.

Finally, in any case, the data subject must be able to exercise the right to erasure or the right to be forgotten according to the provision of art. 17 GDPR.

4. Other key issues for autonomous driving.

Regards to the liability rules, Italian administrative and criminal legislation requires personal liability, and no sanction can be imposed on a person for the behaviour of another person. This provision is stated by art. 11, Law 24.11.1981, n. 689⁷², for the administrative sanctions, and art. 40, Italian Criminal Code, for the criminal sanctions⁷³. This means that if there is no driver who has control of the vehicle at least no administrative and criminal provision can be imposed on the driver. However, in a certain condition the owner of the vehicle or its passengers could be held liable.

Instead, it can be assumed that if the vehicle commits an infringement the sanction goes to the owner (and passengers if applicable). Administrative offences applicable by analogy are artt. 140, 142, 143, 146, 147, 148, 149, 152, 189, New Road Traffic Code. With regard to criminal law, this is a much more complex issue that cannot be addressed here considering both the peculiarity of the matter and the complexity of the offence caused by an autonomous vehicle.

Currently, concluding on Civil liability, already analysed in question n. 1, it can be assumed the Civil liability to three different subjects: all people counted of the concept of producer (according to art. 114 of the Italian Consumer Code); the owner of the vehicle for the sole fact that he/she purchased a self-driving cars and therefore is considered responsible for the damage caused by the same (currently according to art. 2015 and 2054, Italian Civil Code, but probably the legislation will have to be changed especially regarding art. 2054 which does not refer only to the owner of the vehicle but mainly regulates the liability of the driver); and to the passenger on board the vehicle (art. 2051, Italian Civil code).

⁷² Law 24.11.1981, n. 689, Changes to the penal system, available at www.normattiva.it.

⁷³ Royal Decree 19.10.1930, no. 1398, Italian Criminal Code, available at www.normattiva.it.